



The *Capstone* Program is a joint industry and FAA Alaskan Region effort to improve aviation safety and efficiency by putting cost effective, new technology avionics, equipment into aircraft in the Yukon-Kuskokwim delta region as depicted above. This demonstration area is a non-radar environment with most of the air carriers' operations being limited to Visual Flight Rules. *Capstone* will equip up to 150 of the aircraft used by commercial operators in the area with a government-furnished Global Positioning System (GPS) based avionics package. In addition to the avionics suites, *Capstone* will deploy a ground infrastructure for weather observation, data link communications, surveillance, and Flight Information Services (FIS). *Capstone* will also increase the number of airports served by a non-precision instrument approach.

A significant number of mid-air collisions, controlled flight into terrain, and weather-related accidents can be avoided with new technologies incorporated into the *Capstone* avionics package. The *Capstone* program will provide real world information and experience as well as enhanced safety and operational capabilities that can be used to improve the National Airspace System.

Phased installation of *Capstone* equipment began in December 1999 and will continue through 2000.

ALASKAN REGION

Capstone

Investment in Safety



Highlights

- The Capstone Program provides weather, (text and graphics) directly to the pilot in the cockpit.
- Installation of new automated weather systems enables commercial operators to perform GPS approaches at airports in the Yukon-Kuskokwim area.
- GPS non-precision instrument approach procedures are being designed and published for 10 additional remote village airports within the Yukon-Kuskokwim area.
- Introduction of a modern data link network allowing participating pilots to see aircraft traffic via a cockpit display to aid in collision avoidance.
- An interface with the existing radar tracking system provides radar like services to participating aircraft in the Yukon-Kuskokwim delta region. Future enhancements will allow pilots of Capstone-equipped aircraft to see ADS-B *and* radar targets via Traffic Information Service-Broadcast (TIS-B), for all nearby aircraft.
- The University of Alaska at Anchorage will develop and conduct training for Capstone participants as well as perform an in-depth safety study and assessment of the Capstone program.
- Aircraft selected for the Capstone Program receive:
 - An IFR-certified GPS navigation receiver.
 - Automatic Dependent Surveillance-Broadcast (ADS-B) Transmitter/Receiver.
 - A multi-function color display with traffic and terrain advisories.
 - Weather information, (text and graphics) directly to the cockpit..
 - TIS-B providing radar traffic information.
 - Terrain Database.
 - IFR Database.

Technical Information

HARDWARE



photo by UPS Aviation Technologies

GPS - The Apollo GX60 navigation system is a non-precision, IFR approach certified GPS receiver meeting the requirements of TSO-C129A Class A1. The unit features a high definition moving map display on a sun light viewable screen, an 8 channel GPS receiver and an 8 watt, 760 channel, VHF Communications unit to minimize consumption of panel space.



photo by UPS Aviation Technologies

MFD - The daylight visible, multifunction Apollo MX-20 display features a 6" AMLCD display screen and supports 65,536 simultaneous colors at a pixel resolution of 640x480. It contains a Pentium processor for integrating ADS-B, GPS, terrain, weather graphics, and navigation database information. The MFD provides enhanced situational awareness by positioning the aircraft icon over a moving maps depicting terrain, traffic, and weather.



UAT - The Universal Access Transceiver is a transmitter/receiver combination that communicates the datalink information for the ADS/TIS/FIS services air-to-air between aircraft, as well as between the aircraft and the ground stations. The robust, 50watt, remotely mounted, UHF transmitter reports the aircraft data at 1 second intervals. A smaller, less powerful version of this unit may be developed for use in airport ground vehicles to alert pilots of their location and avoid incursions.

FUNCTIONS

ADS-B - Automatic Dependent Surveillance-Broadcast is a function that broadcasts position, altitude, vector and other information for use by other aircraft, vehicles, and by ground facilities. ADS-B supports improved use of airspace, improved surface surveillance, and enhanced safety (such as conflict management) for users.

FIS - Flight Information Services function allows an aircraft to receive current and forecasted weather and weather-related information as well as the status of Special Use Airspace (SUA). The enhanced weather products will be available to the pilots and controllers allowing them to share the same situational awareness. This information will be displayed either in text or graphical form, as selected by the pilot.

TIS-B - Traffic Information System - Broadcast function will provide the capability to determine aircraft position using radar and to broadcast this position information to airborne aircraft that are ADS-B equipped.

Terrain Awareness - The terrain information is depicted relative to the aircraft's position so that bearing and distance may be determined. A flashing terrain advisory flag is displayed whenever the aircraft is within 500 vertical feet of terrain, or when the aircraft is within two minutes, horizontally, of terrain.

For more information visit the *Capstone* website at: www.alaska.faa.gov/capstone